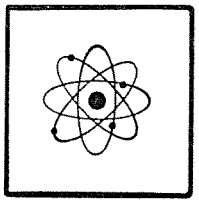
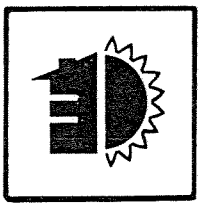
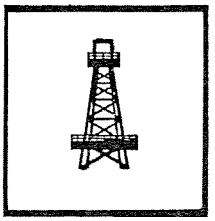
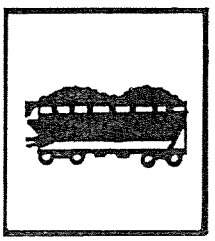
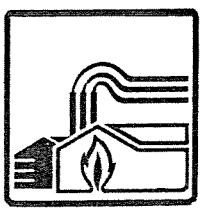
ENERGY PLAN

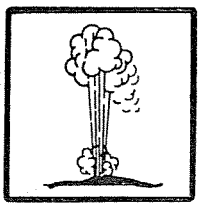


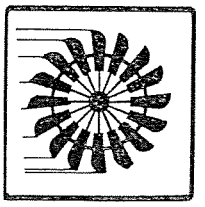












1982

STATEMENT

This report was prepared by the Governor's Energy Resource Policy Board, sponsored by the Pacific Northwest Regional Commission. The Commission has not approved the report, nor does it guarantee the accuracy of the completeness of the data. The statements, findings, conclusions, and recommendations contained in the report are solely those of the project and do not necessarily reflect the views of the Commission.

The Idaho State Energy Plan

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February, 1982

JOHN V. EVANS
GOVERNOR

OFFICE OF THE GOVERNOR
STATE CAPITOL
BOISE 83720

February 19, 1982

A MESSAGE TO THE PEOPLE OF IDAHO:

I am pleased to make available to the citizens of Idaho the Idaho State Energy Plan. This final plan reflects the eighteen-month effort of the Energy Resource Policy Board to assess the impact of the many changes in our energy situation. This plan also provides the people of Idaho with an outline of how the state can, through a series of policies and suggested legislation, assist the energy providers of the state in supplying adequate energy for Idaho's future.

The availability of long-term energy supplies at reasonable costs is critical to the well-being of our state. We must plan realistically, conserve our available resources and develop new energy sources to assure orderly and reasonable economic growth for Idaho. This plan outlines in a detailed manner where Idaho can, and perhaps should, look for future energy supplies. It also suggests the necessary incentives that will make our considerable indigenous renewable resources more attractive.

The plan has been presented to the House Resources and Conservation Committee of the Idaho Legislature for their review and action. I have transmitted the final plan to the Idaho Water Resources Board for implementation.

This plan is a continuation of my commitment to place energy planning, conservation and development on a high priority level within my administration. I ask for the support of the people of Idaho to assure that the State Energy Plan continues to reflect the needs of the people. I urge every citizen to monitor the plan as it is put to practical use and to suggest changes to the Idaho Water Resources Board when necessary. These efforts will do much to assure economic, social and environmental benefits to the people of Idaho.

Sincerely,

JOHN V. EVANS
GOVERNOR

IDAHO STATE ENERGY PLAN

CONTENTS

The following Appendices to the State Plan are available by contacting the Division of Energy, Department of Water Resources, Statehouse, Boise, Idaho 83720.

INTRODUCTION AND OVERVIEW

The decade of the 1970s marked the beginning of a new energy era. Energy prices, in real terms, began an upward spiral. Public and private utilities serving Idaho's electrical needs could no longer anticipate the traditional low-cost hydropower meeting the demands of our rapidly growing population. Adding supply from conventional thermal generating facilities has greatly impacted Idaho ratepayers.

Idaho shares with the rest of the nation the general problems associated with energy supplies and costs. Many of the problems have been precipitated by global events such as disruption of oil supplies from the Middle East and increased natural gas costs from neighboring Canada. Though Idaho has no dependence on petroleum for electrical generation, our entire economy is tied to the availability and cost of petroleum products. Most importantly, all components of the cost of new generating facilities, including capital costs, have climbed in the years since the first OPEC crisis.

In response to these changes in cost and supply of energy to meet Idaho's growing needs, Governor John Evans appointed the Energy Resource Policy Board in 1980 to begin the process of defining the state's role in energy planning and policy.

The Idaho State Energy Plan, prepared by the Board, provides the people of Idaho with an outline of how the state can, through a series of policies and implementing legislation, assist the energy providers of the state in supplying adequate energy for the future.

The purpose of the plan is to assess Idaho's energy position and resources, to evaluate the potential demand versus supply capabilities and to set forth policies which can encourage development of adequate supply considering technical, social and economic factors.

It is the objective of the Plan to ensure the development of energy resources which will provide sufficient energy supplies for orderly and reasonable industrial and economic growth for Idaho.

It is the conclusion of the Board that no one energy resource is sufficient to meet the varied needs of the state. Instead, the state will benefit most over the next two decades by pursuing the development of a variety of resources. Correspondingly, the state will be best served in first improving what it has. Through conservation and the upgrading of existing energy systems, either utility or industrial, the state has the best short-term opportunity to increase generating capacity and moderate the growth in demand. This course buys time, limits new demands on the environment and is the most cost-effective choice before us. After this important step, the state should seek opportunities to utilize instate resources.

This document represents a major step toward the implementation of an effective State Energy Plan, and offers a background for legislation. It summarizes the major energy issues confronting Idaho, including availability, cost, social and environmental impact of the various energy sources, and barriers to their development. Each subsection, dealing with a variety of energy resources and conservation by category of use analyzes the current situation, the issues, and presents a policy statement and an implementation plan.

The Energy Resource Policy Board reached its conclusions through a year and a half of deliberation, which included presentations by nationally recognized experts in the major energy related fields, consultation with major Idaho utilities, the reports of five task forces and a series of

public hearings in which comments were made on a Draft State Energy Plan. The identification of the resource people, the task force memberships and proceedings of the public hearings are available in Appendix A.

The preparation of this Plan is only the first step of a program involving continuing review of energy affairs in the state. This is important for several reasons. First, the members of the Energy Resource Policy Board prepared their best perspectives, based on what they knew as of that moment. Idaho is entering a period of extremely rapid change in energy prices and technology. Private research and development, new federal, state and local incentives, the utilities' increased involvement in conservation and renewable energy, and the passage of the Northwest Power Bill will all affect Idaho's energy future.

Second, major development of both renewable and conventional energy sources will require economic, sociological and environmental tradeoffs. As choices are made to develop the variety of energy resources, energy users, energy providers and governments must be prepared to deal with the impacts of those tradeoffs. The anticipated conservation efforts will also affect the assumptions and projections set forth in this Plan. Therefore, Idaho's Plan should be revised and updated periodically to account for the changes these factors will bring.

For this reason, this Plan recommends that an Energy Resource Policy Board of similar composition to the present Board, which represents a variety of energy providers and energy users, periodically review and update the State Plan. The Board should be appointed by the Governor and confirmed by the Idaho Senate. As a minimum the Board should provide a report to the Governor and the Legislature annually. It is suggested that support for the Board should be provided by the staff of the Idaho Department of Water Resources.

Because Idaho can plan for future electrical needs, and because those needs can be met in a variety of ways with indigenous resources for generation and/or displacement, the Board chose to emphasize electricity in dealing with the forecasts of supply and demand. The same efforts at planning and conservation must be made for all energy sources and the same increased demands can be anticipated as Idaho potentially adds 900,000 people in the next 32 years.

The document that follows summarizes the findings of the Board and provides recommended state policies which will best serve the state over the next twenty years and will meet the objectives of the Board.

ELECTRICITY

OVERVIEW:

Idaho has historically relied on hydroelectric power as its principal source of electricity. This has resulted in Idaho having one of the lowest electric rates in the nation. However, during the past 15 years electrical demand has grown at a rate that has utilized the output of the most acceptable hydro sites. The Idaho utilities have thus supplied the increasing demand from building, or participation in building, thermal plants. The capital and operating costs of these new plants have caused a general increase in electric rates. At present, all thermal facilities from which Idaho derives electricity are out of state.

Currently, Idaho has three major private utilities: Idaho Power Company, Utah Power and Light, and Washington Water Power. These three utilities supplied Idaho with 1929 average megawatts of electricity in 1980. Currently planned additions by these utilities total 1037 average megawatts through the year 2000. The remaining 12 percent of Idaho's electrical demand is met by the many rural electrical co-ops and municipal systems, most of whom purchase their power through the Bonneville Power Administration.

CURRENT SITUATION:

Unlike other forms of energy used in Idaho, large quantities of electrical energy are produced within the state. Idaho's private and public utilities, along with the federal government, own and operate the vast hydroelectric system which provides approximately 70 percent of Idaho electrical needs. Idaho currently has no in-state thermal generating capacity, other than limited cogenerating facilities which utilize forest products.

Potential

As major hydroelectric additions became limited, the utilities began programs to add new capacity by the construction and operation of thermal facilities. Idaho Power Company has plans for 529 megawatts of capacity from new hydro sites and 250 megawatts from coal. Utah Power and Light plans the addition of 1500 megawatts of new generation from coal through 1988. A portion of this capacity will serve Idaho customers. Washington Water Power anticipates additions to its generating capacity of 1016 megawatts, provided by a 40 megawatt wood waste facility, and portions of Washington Public Power Supply System (WPPSS-3), Colstrip and Creston coal facilities. Most public utilities within the state are participants in the WPPSS nuclear facilities in Washington State. The city of Idaho Falls is constructing new hydroelectric facilities.

The state's publicly owned cooperatives are members of the Pacific Northwest Generating Group which plans to construct and operate facilities over the next twenty years.

In general, beyond the currently planned hydro additions by Idaho Power, sites for further, large scale hydroelectric development are likely not available. There remains some potential for hydro upgrades and small and lowhead hydro development, but major sites that would not impact the environment and quality of Idaho living are unavailable.

Due to Idaho's location, coal is a logical fuel source and as a result of Idaho's many years in nuclear technology development, nuclear may be a potential electrical source. Both of these potentials are discussed at length in subsequent sections of this Plan.

Less conventional sources of electrical generation are also under development. Geothermal, municipal waste resource recovery, wind and cogeneration are likely options in Idaho's future energy mix. In addition to potential new generation from the aforementioned sources, renewable resources, conservation and natural gas provide a viable potential for displacement of electricity in Idaho.

Table 1 illustrates the source of Idaho's electrical supplies in 1980 and indicates the potential capacity additions and maximum potential displacement possibility by 1990 and 2000 respectively. Displacement means that in some cases, renewable resources, natural gas and conservation can provide energy for needs that are currently being met with electricity.

Table 1

PRESENT ELECTRIC ENERGY SUPPLY

Average Megawatt Capacity

Electric Generation: 1980

Utility	Idaho Share	Total Resource
Idaho Power		
Thermal	486 Mw	512 Mw
Hydro	894	941
Other	11	11
Total	1391	1464
UP&L		
Thermal	450	1958
Hydro	12	51
Other	2	6
Total	464	2015
WWP		
Thermal	55	138
Hydro	179	447
Other	28	71
Total	262	656
Systems Total	2117 av.Mw	4125 av. Mw

Cogeneration 100

Total 1980 Supply 2217 av. Mw

POTENTIAL ELECTRIC ENERGY SUPPLY

Megawatt Capacity

Electric Generation:	**1990**	**2000**
Small Hydro	200	350
Geothermal	5	100
Waste Recovery	4	15
Wind	5	40
Cogeneration	90	125
Coal	400	800
Nuclear	0	500
Total	704 Mw	1950 Mw

Displacement	Maximum	Potential
Conservation	180	450
Solar	50	130
Geothermal	60	200
Wood	30	40
Natural Gas	200	550
Total	520 Mw	1370 Mw

Utility Planned Resource Additions	923 Mw	1037 Mw

TOTAL POTENTIAL ELECTRICAL SUPPLY

Total 1980 Supply	2217	2217
Potential Generation	704	1950
Potential Displacement	520	1370
Utility Planned Resource Additions	923	1037
Total Potential Supply	**4364 Mw**	**6574 Mw**

The renewable resource and conservation estimates are potentials recommended by the Task Force on Renewables and Conservation. Nuclear is shown with a contribution in the 2000 time frame assuming the siting of a reactor at INEL (See Nuclear Section of the Plan). Coal projections are based on a seven to eight year time requirement to site and construct a facility of 400 MWe. For this review, the process was assumed to begin in 1983. Natural gas assumes the full utilization of the excess capacity of the state's natural gas utilities by the year 2000.

This data suggests that Idaho has a number of viable options through a combination of new capacity additions and displacement to meet its electrical energy needs. However, one of the key questions is what electrical demand growth rate will Idaho experience over the next 20 years?

Idaho's population has grown at an annual compound rate of 3.68 percent per year between 1975 and 1980, and at 2.8 percent over the ten year period of 1970 to 1980. Idaho's population increased from 712,000 to 943,000 during the decade of the '70s, a 32 percent increase in 10 years.

Idaho is projected by the U.S. Census Bureau to be the 7th fastest growing state in the nation during the 1980s. During the last 50 years, Idaho's lowest compound annual population growth rate was 2.1 percent during the 1960s. Except during the 1920s, it has always exceeded 2.5 percent per year. These facts suggest that Idaho should expect population growth at, or above the historical rates.

One of the key effects of population growth is electrical demand. Idaho uses an above average per capita amount of electrical energy. This probably results from the low cost of hydro-produced electricity encouraging its use for space heating, water heating and other domestic needs.

During the 1970s, the effective per capita electrical energy consumption grew at an annual rate of 6.16 percent, or over twice the population growth rate which was 2.84 percent during the 1970s.

Based on the historic population growth, electrical demand growth and current economic events in Idaho, the Board feels that the electrical growth rate will more nearly equal the population growth rate as opposed to being twice that of the population growth. The most probable population growth rate will approach 3 percent per year between 1980 and 2000. However, the sensitivity to these assumptions was tested by assuming a low rate of 1.5 percent per year and a worst case rate of 4.5 percent per year. The following table shows the impact of these three growth rates on electrical demand.

Table 2

ELECTRICAL ENERGY DEMAND SCENARIOS

1980 Base Year	Growth Rate	Megawatts	
1929 av. MW		1990	2000
	1.5 percent	2241	2604
	3 percent	2604	3515
	4.5 percent	3025	4745

In the case of the low demand growth rate the potential supply shown in the previous table far exceeds the demand. However, at the high growth rate of 4.5 percent, additional generating facilities are clearly required.

While the state appears to have abundant electrical generating or displacement options for the low to medium growth scenarios, it should be noted that there appears to be a real trend of increasing frequency and duration of industrial curtailments for the state's larger interruptible electrical energy users. This trend may possibly portend a near-term peak demand, if not an average capacity shortage.

Economics

The economics of each energy option are discussed separately in the following sections of the Plan. However, it is clear that conservation measures, conversion to natural gas and efficiency improvements will be more economic than building new thermal plants. An accelerated program in these areas can in fact increase the state's generation margin. The renewable resources, while having large potential for displacement, will be used only when economically justified.

Environmental Considerations

Each unique energy source has its own environmental characteristics which are addressed separately in their respective sections of the Plan.

Health and Safety Impacts

Impacting health and safety considerations are discussed by resource where applicable.

Social Impact

The state has a series of realistic choices for meeting electrical demands. Decisions made outside the state can influence our energy situation. The state should be aware of national actions and must exercise diligent attention to contingency planning. The decisions made by Idaho utilities could and likely will have a significant social impact on the economy and on our general lifestyle. These social aspects of the electrical energy choices must be evaluated with care and depth.

ISSUES:

The issues related to the supply of electrical energy include:

- **What priority should be placed on non-conventional energy systems?**
- **Should local governments be given revenue bonding authority for energy facilities?**
- **What should be the near term priority for increased generation capacity?**
- **What considerations must be given to our agricultural industry?**

— **What should be our position on conversion to natural gas for space and water heating?**

— **Are current electrical utility curtailment policies adequate?**

POLICY STATEMENT:

It is the policy of the state of Idaho that the private and public utility companies place a high prority on conservation, renewable resources, generating resources of high fuel conversion efficiency and then on all other resources in meeting the future electrical needs of the state. Further, in the development of renewable resources, the state, should give a high priority to hydroelectric projects, in particular, the upgrading of current facilities within the state.

POLICY IMPLEMENTATION:

1. The Idaho Public Utilities Commission should continue, through its regulatory authority to encourage the commercialization of alternative energy systems through utility demonstration projects, incentives for cogeneration and the displacement of added electrical consumption by other energy sources where cost-effective.

2. The Idaho Constitution should be amended to authorize local governments and irrigation districts to issue revenue bonds for purposes of developing electrical power generating facilities or facilities for electrical displacement.

3. Priority should be given to the review of sites and approval of projects related to hydro generation and existing hydro upgrades.

4. Because of the importance of agriculture in Idaho, the Idaho Public Utilities Commission should carefully consider all electrical generating capacity additions and their impacts on agriculture.

5. The Idaho Public Utilities Commission should implement programs that favor conversion of existing homes and businesses and initial installation on new construction for the utilization of natural gas for space and water heating.

6. The state should periodically review and update the present utility curtailment plans filed with the Public Utilities Commission.

Nonrenewable Resources

Over 80 percent of the energy used in Idaho comes from nonrenewable resources found outside the state. Coal, petroleum, natural gas and uranium all contribute to this energy mix. With the exception of our use of hydropower, discussed in the renewable energy section of this Plan, Idaho is almost totally dependent upon these imported resources. To date, no large deposits of coal, petroleum or natural gas have been discovered in the state.

Because of this dependence, national and international decisions and policies relating to price and availability of these resources can greatly affect Idaho. The situation may change if on-going exploration for petroleum products in the Overthrust Belt of eastern Idaho proves successful.

Idaho will, in any event, continue to be dependent on other states and countries for a large share of its energy needs over the next two decades. Therefore, conservation of these energy sources is the greatest opportunity for the state. By changing our consumption patterns, we can buy time without greatly impeding the economy of the state. However, conventional nonrenewable energy resources will likely play an increasing role in the Idaho energy mix. This section of the Plan deals with these resources.

COAL

OVERVIEW:

The size of America's known coal reserves makes coal an attractive energy resource, and a major alternative to expensive and unreliable supplies of foreign oil. Historically, Idaho has used coal for space and process heating, but with the advent of more economically and environmentally attractive methods of space heating, the use of coal has been reduced. However, because of abundant coal reserves, and the potential need for additional energy sources, Idaho may experience a greater reliance on coal in the next two decades. Increased consumption of coal also increases the potential for air, water and land pollution.

CURRENT SITUATION:

Because of the proximity of Idaho to the major coal fields of the western United States, coal should be considered as part of Idaho's future energy mix. Coal's greatest potential use in the near term is for the generation of electricity.

As hydroelectric sites become limited, utilities have turned to coal and all the private utilities in the state either operate or participate in coal fired generating facilities. Some Idaho industries use coal for space and/or process heat. For example, the sugar industry uses coal for cogeneration to produce steam for processing and electricity to run equipment. The Idaho National Engineering Laboratory is constructing a facility using coal to provide steam for its chemical reprocessing plant.

Potential

Based on existing and planned projects, coal will account for approximately 9 to 15 percent of Idaho's total projected energy demand in 1990. As industrial and commercial users switch to coal, this percentage may increase.

Between 1990 and 2000, it is likely that coal will be used to produce synthetic liquid and gas fuels. However, several factors introduce considerable uncertainty as to the levels of synthetic fuels production in the next two decades. For example, the costs involved and venture capital available are perhaps the greatest constraints. Competing energy sources, as well as technology for direct coal combustion, are in many cases more attractive than synthetic fuels. Also, many technological, environmental, socio-economic and political factors must be resolved before massive synthetic fuel production can become a reality.

Nevertheless, as world oil production levels off and begins to fall, coal will have to be called upon to make up the deficit and also meet the normally expected increase in energy demands.

Economics

Idaho consumers are experiencing increased electrical rates; much of this increase is the result of Idaho utilities' participation in, and support of, coal-fired facilities. The price of coal generated electricity compares favorably with that of other nonrenewable energy sources, and on a Btu basis, coal will without a doubt continue to cost less than oil. Coal is most comparable to, and

competitive with, nuclear energy. Coalfired plants are less capital intensive, but have higher operating costs, primarily due to fuel prices. The electricity costs from coal and nuclear plants are similar in magnitude, with coal having an advantage in areas that are adjacent to western coal fields.

Environmental Concerns

Potential environmental problems normally addressed with coal fired plants are:

- Nitrogen oxide emissions
- Sulfur dioxide emissions
- Potential leachate of trace elements from ash/sludge
- Water use (in certain areas)
- Carbon dioxide emissions

Potential coal fired plants in Idaho will likely use low sulfur Wyoming coal, thus reducing some of these hazards. In addition, scrubbers installed at the time of construction also reduce pollution. Further concern is often expressed for the "greenhouse effect" of increased carbon dioxide emissions which could cause critical climatic changes in the future. Other obstacles to overcome for further large-scale development include such factors as the impacts of large mining operations in neighboring states, coal handling logistics and disposition of combustion waste products. New combustion technologies hold promise for reducing many of the environmental problems associated with the use of large-scale coal burning facilities.

Health and Safety Impacts

Although coal has made a substantial contribution to the economic well being of the country, it has also endangered health and safety, both in obtaining the resource and in using it as an energy producer.

Social Impact

The greatest social impact Idaho will feel from introducing coal into its energy mix is the potential "boom town" effect on the communities near a coal plant siting. The ability of an area, or local unit of government, to deal with the public works developments, i.e., schools, water, sewer, are likely to be of major concern to the people of that locale, and of the state.

ISSUES:

- **Should Idaho rely on coal as a resource?**
- **If coal is included in the energy mix, should a thermal plant be located in Idaho?**

— **Should industries be encouraged to convert to coal for direct use applications?**

POLICY STATEMENT:

The state of Idaho should consider a coal-fired plant as a viable option in the energy mix. At the time of evaluating the need for a coal generating plant, consideration must be given to the anticipated contribution from conservation, renewable resources and utilization of waste heat. An in-state coal-fired plant will only be considered if economic, environmental and regulatory considerations are favorable to the residents of Idaho.

POLICY IMPLEMENTATION:

1. The state of Idaho should establish clear and definitive ground rules for coal use, and encourage the utilities, or other entities, to use a citizens' committee to advise in the siting process.

Substantiating data and additional technical information relating to this section can be found in Appendix B.

NUCLEAR

OVERVIEW:

The Idaho National Engineering Laboratory in Idaho has been the leader in the development of nuclear power technology. In 1951, the world's first electricity from a nuclear-fueled system was generated by the EBR-I plant at the Atomic Energy Site near Arco, Idaho. Today, nuclear-generated electrical power represents 12 percent of the nation's total electrical generation capacity and will supply about 20 percent by 1990, with the plants currently under construction. However, there has been a substantial cutback in plans for new nuclear power plants during the past five years. This trend has resulted from economic, environmental and social factors which are discussed below.

Presently no utility is contemplating construction of a commercial nuclear plant in Idaho. However, the U.S. Department of Energy is studying the possibility of siting either a commercial-scale breeder reactor or a replacement production reactor at the Idaho National Engineering Laboratory. Either of these has the potential for electrical generation.

CURRENT SITUATION:

Electricity from nuclear plants is currently being used within Idaho. A small share of the output of the N Reactor, Hanford, Washington, and the Trojan reactor, Rainier, Oregon, is distributed through the Bonneville Power Administration (BPA) grid to rural cooperatives and municipal utilities in Idaho. This supply will increase as Washington Public Power Supply Systems plants 1, 2, and 3 are completed in the 1980s. In addition, the Experimental Breeder Reactor (EBR II) at the Idaho National Engineering Laboratory (INEL) has, for over 15 years, produced approximately 19.5 MWe for distribution through the INEL grid.

Potential

Nuclear power represents a large potential for electrical generation. However, as discussed in the economics section below, its use for meeting the needs of Idaho over the next twenty years is probably limited. Two other factors that suggest a present generation light water reactor might not fit the Idaho utilities' needs are size and time to construct. Current light water reactors (LWRs) are in the 1000 to 1300 MWe range which is well above the incremental needs of Idaho. Additionally, the current 10 to 14 year lead time for completion of an LWR does not fit with the anticipated electrical needs of the state in the next decade.

Two federal projects are under consideration which could provide electrical energy to Idaho in the 1990 to 2000 time period. The first possible project is for the construction of a full-scale liquid metal fast breeder reactor (LMFBR) to demonstrate the feasibility of operating a commercial size breeder facility. Indications are that because of recent administrative and congressional actions supporting the Clinch River Breeder Reactor, it is unlikely that a large-scale LMFBR will be funded in the immediate future. However, with the INEL's 20 years of LMFBR experience it remains a logical site if the government proceeds.

The second potential project is a replacement production reactor (RPR) constructed to produce weapons grade material for the Department of Defense and to produce steam as a by-product. Studies have been commissioned by the Department of Energy to explore the feasibility of constructing the RPR at INEL, at the Savannah River site, or at the Hanford site.

The proposed government reactors would produce heat which could be used to generate electricity or could be used directly in other applications. If the government also built the generation facility for such a reactor in Idaho, it is likely that the electricity produced would be distributed through the BPA grid and thus be available only to participating utilities. Both the allocation and price of electricity in the BPA grid would depend on contracts negotiated under the requirements of the Northwest Power Planning and Conservation Act. However, if the generation facility were to be built by a private utility, the electricity would be distributed through that utility's system.

The capacity of the proposed plants would probably range between 1000-1600 MWe. The demonstration breeder reactor could be expected to have a capacity factor (actual power produced compared to plant potential) similar to EBR II, which has averaged 58 percent since 1970 with a highest yearly average of 76.9 percent. However, the capacity factor of an RPR may be lower because its primary mission (weapons material production) could require frequent shutdowns for refueling. Depending on the design approach, such shutdowns could result in intermittent supplies of electricity.

Economics

Conventional LWRs have been used to produce electrical power for over two decades. Plants presently in operation are producing electricity at costs competitive with coal-fired thermal plants, but in Idaho, coal has an advantage because of our proximity to the western coal fields.

Long lead times in the United States for licensing and construction have made nuclear projects susceptible to inflation and high interest rates which add enormously to the initial cost estimates. Government regulations for design and operation safety are continually being revised, causing delays and escalating costs.

The uncertainties that beset nuclear power cost projections also exist with other energy developments, but not to the same degree. The prevailing factor is time and the longer the project takes before completion, the more uncertain the cost projections.

The experience in nuclear power plant construction of the Washington Public Power System (WPPSS) displays a "worst case" situation of how costs can escalate. Originally planned to cost approximately four billion dollars, the latest estimate for the five plants programmed by WPPSS is $23.8 billion. The WPPSS-2 project is currently seven years behind schedule. In just the three years between 1978 and 1981, the financing costs to WPPSS jumped from less than seven percent to fifteen percent. The WPPSS experience should not be considered as a model for nuclear power cost projections, but it does vividly illustrate the vulnerability of plant costs to time factors, delays and changing economic conditions.

A new issue raised by the Three Mile Island accident, which probably impacts the future of nuclear power in the U.S. more than any other, is the potential financial impact of a nuclear plant accident on the utility owner. The TMI accident has nearly bankrupt an otherwise healthy utility, General Public Utilities Company.

Nuclear power plants are capital intensive but have low operating fuel costs when compared to oil and coal plants. However, there are certain other factors that must be considered in nuclear plant economics. These are fuel reprocessing, waste disposal and end-of-life decommissioning.

Commercial fuel reprocessing was suspended in 1977 as a national policy issue related to nuclear proliferation; it is just now being reinstituted. Reprocessing is used to recover the unused fuel in nuclear fuel elements while also concentrating the radioactive materials produced. To date commercial reprocessing has not been done on a large scale in the U.S. so costs for closing the fuel cycle are still estimates.

Waste disposal, either from reprocessing or a throw-away fuel cycle, is another cost that must be considered. Although the total absolute cost of commercial-waste disposal facilities is high, when these costs are factored into the lifetime electrical costs of the facility, the increase per kwh is relatively low.

Decommissioning is necessary for many facilities used at the various stages of the fuel cycle. There has been very little experience in this process, but national studies indicate that decommissioning costs for a large facility could be approximately 10 percent of construction costs. These costs have not always been factored into current rates, but should be included in the future.

The two federal projects being considered for Idaho could potentially provide electrical energy at a "then prevailing rate" if the steam or electricity produced is made available to Idaho utilities. However, at this early point in time, no final decision has been made on either project or how the resulting energy would be distributed.

Environmental Considerations

Environmental impacts resulting from nuclear power generation are related to the land disruption from mining, localized thermal pollution from the heat produced and a strain on water supplies because of expanded use. Careful siting of nuclear plants can reduce the environmental impacts.

Additional discussions on the health, safety and environmental aspects of nuclear power are presented in the following section.

Health and Safety Impacts

While it is true that no member of the general public has been either injured or killed from nuclear power plant operation, it is equally true that the potential exists for health and safety problems throughout the fuel cycle. Concerns center around the possibility of a major accident which could release radioactive materials, the effect of direct radiation exposure from the fuel cycle, and the safety of waste storage techniques presently employed.

Under normal operating conditions risks are considered very small, therefore discussions of safety issues usually concentrate on accident situations or the impact of human errors and inadequacies. Since nuclear plants are designed to protect public health and welfare in the event of the most serious accident, the issues then center around the adequacy of plant design to mitigate such accidents. For LWRs, the worst-case accident involves loss of cooling in the reactor. The Three Mile Island accident was, in fact, a loss of coolant accident and produced a degraded or partially melted reactor core. Proponents of nuclear power point to TMI as a good example of the in depth safety built into the plant, while opponents point to TMI as a "near miss."

Reprocessing, which is optional for LWRs but would be required for either an LMFBR or RPR, would introduce additional risks to personnel and the public. However, reprocessing would decrease the need for uranium mining and milling and, thus, would reduce the consequences of those operations.

Mining and milling generates the largest quantity of low level waste in the form of tailings and constitutes the most direct, localized health hazards to the public. Conversion, enrichment and fabrication processes all involve minimal releases of radioactive material.

High-level waste from commercial plant operations in the form of spent fuel assemblies is stored in pools at reactor sites. Reprocessing and recycling of this fuel is now possible, but no commercial projects are planned at this time. Several methods of permanent storage of high-level waste have been considered but decisions are still pending. Isolation in geological formations seems to be the most practical solution although there are still many questions conerning this option. Low-level waste from commercial plants is handled at three disposal sites in the U.S. The capacity of these sites will be adequate only until 1984-85. Under recent legislation, the responsibility for new wastes has been given to the states.

The storage site for high-level waste from a new government reactor at INEL would depend on the location of the reprocessing plant. It is possible that the waste would be kept at INEL where some government high-level waste is now calcined and stored. Low-level waste would be stored at INEL where about 4.2 million cubic feet of low-level waste is now buried. Evaporation, seepage ponds and injection wells are used at the site for disposing of waste water.

Social Impact

Nuclear power plants have the same social impacts as any large centralized facility. There are local impacts during construction due to a large influx of workers. However, after startup, a typical plant employs fewer than 350 people.

On a national level, the political and social impacts relate to security and proliferation. All fission cycles produce some plutonium. This material, when concentrated, can be used to construct a weapon. Although material for bombs may be derived from expended fuel, plutonium recovery would require a sophisticated chemical process. The reprocessing performed for an LMFBR or RPR would create more opportunities for diversion of plutonium and tritium.

In the present social environment, security of nuclear facilities and fuel shipments have become important. Sabotage and diversion must be guarded against. While this security need results in some reduction in freedom of individual plant employees, it does not impact society as a whole.

ISSUES:

- **How do the economics of nuclear power compare with those of coal and other alternatives?**
- **What are the effects of nuclear power on the environment and human health as compared with those of coal and other alternatives?**

— **Should Idaho utilities be encouraged to invest in commercial nuclear generation plants?**

— **What position should Idaho take on the RPR or LMFBR projects at INEL?**

POLICY STATEMENT:

1. The state of Idaho should consider nuclear energy as a viable option in the energy mix. At the time of evaluating the need for a nuclear generating plant, considerations must be given to the anticipated contribution from conservation, renewable resources and utilization of waste heat. An in-state commercial nuclear plant will only be considered if economic, environmental and regulatory considerations are favorable to the residents of Idaho.

2. The state will support the location of a government financed LMFBR or RPR at the INEL provided that the facility would provide electrical energy at competitive rates to Idahoans. It is recommended that not less than fifty percent of the electrical generation from such a facility be made available to public and private utilities in Idaho with not more than fifty percent distributed through BPA.

POLICY IMPLEMENTATION:

The Idaho Public Utilities Commission and the private utilities should periodically review the role that conventional nuclear energy should have in the state's electric energy mix.

Substantiating data and additional technical information regarding this section can be found in Appendix C.

PETROLEUM

OVERVIEW:

Petroleum provides over 50 percent of Idaho's current energy supply. Included in this section are considerations for light and middle distillates (gasoline, diesel and home heating oils), heavy distillates (residual oil used in industrial boilers and in asphalt) and propane. Our supplies of all of these, except propane, are currently tied to foreign reserves and production rates. Political events abroad have led to shortages of these fuels in the past decade and may lead to others in the future. Idaho's number one economic producer, agriculture, is extremely dependent on adequate supplies of petroleum products.

Petroleum will continue to contribute in a major way to the economy of the state over the next two decades. During these decades, the exploration of the Rocky Mountain Overthrust Belt may make Idaho one of the producing states. This development has the potential to provide the state with additional revenues from taxes and industrial activity and may provide more reliable supplies of petroleum products for Idaho.

Even with strong conservation efforts and conversions to alternate energy sources, the increased demand of Idaho's growing population indicates that we will probably continue to rely on petroleum for as much as one half of our total energy needs in the year 2000.

CURRENT SITUATION:

Idaho has no petroleum production in the state nor does the the state have a refinery. All petroleum supplies are imported in a refined form. Shipments of petroleum products come through pipelines, by truck, train and boat. Idaho receives products from twenty different suppliers with over 95 percent of the total coming from ten major companies.

Unlike other states, Idaho uses petroleum primarily for agriculture, transportation and home heating. Our electric utilities have no substantial generating facilities dependent on petroleum. As our major user of oil, agriculture has a heavy dependence on adequate supplies for all phases of its operation from planting, to harvest, to transportation, to sale for processing. Farmers are continuing to expand their plantings and production, resulting in an increased demand for petroleum. Larger harvests may ultimately lead to higher demand for diesel and gasoline.

Potential

Idaho petroleum consumption patterns closely parallel the national oil appetite which has shown a history of growth except during occasional periods of recession or shortages. In 1978, however, the consumption trend turned downward as the combined effects of sharply rising prices and general inflation caused motorists to choose more fuel efficient vehicles and to reduce their driving. As prices continued to climb, consumption continued to fall. This decrease indicates considerable demand elasticity, especially as compared with previous expectation. In 1980, Idaho's motor fuels consumption declined 9.4 percent from the previous year.

Idaho has taken steps to improve the efficiency of petroleum products use. Tax incentives exist to encourage the production of ethanol for use as an additive to gasoline. In 1977, the state instituted

a State Energy Conservation Plan with the goal of reducing consumption by five percent by 1982. Government and business have instituted such programs as flexible work hours and car and van pooling and some cities have provided mass transit systems. Additional steps can be taken by the citizens of the state.

Economics

In the last six years the drilling in the Overthrust area of Idaho has had considerable economic impact. In that period over 150 million dollars has been invested in drilling operations. Oil and gas leases on state land are now available through public auction. The first auction for these state leases was held in September, 1981 and provided $1.3 million dollars to the state endowment fund. Subsequent auctions will be held quarterly commencing in February, 1982. Revenue estimates from these future leases project three to four million dollars annually. The state has prepared for additional revenue by enacting severance taxes to be applied on the extraction of petroleum found in the state.

Idaho has felt the economic impact of reduced motor fuel consumption which has reduced revenues from the state gasoline tax which provides funding for the state highway system.

The tourist industry, which contributes greatly to Idaho's economy, is subject to considerable impact both from availability and prices of petroleum.

Environmental Concerns

Air pollution from auto exhausts poses the biggest environmental concern from the use of petroleum products. Another concern is for the possible adverse impact on the lands subject to petroleum exploration.

Residual oil having high sulfur content has environmental impacts in industrial applications unless proper emission controls have been installed.

Health, Safety and Social Impacts

Proper emission controls on all vehicles considerably reduces the health hazards associated with air pollution caused by the internal combustion engine.

As activity in the Overthrust continues, communities in these areas may well be heavily impacted by demands placed on their schools, water and sewer systems and other public services which will be required by the influx of large numbers of people.

ISSUES:

- **Should the state of Idaho have ready contingency plans to mitigate the effects of petroleum shortfalls?**
- **Should the emergency powers of the Governor be defined to enable contingency plans to be implemented?**

— **Should increased conservation measures be developed and encouraged?**

— **Should the exploration and development of Idaho's Overthrust Belt be encouraged?**

POLICY STATEMENT:

It is the policy of the state of Idaho to promote petroleum conservation.

It is the policy of the state of Idaho to approve the exploration and development of in-state petroleum resources where consistent with state and federal laws.

As part of the state emergency plans, the state should have petroleum shortfall contingency plans and the authority to carry out those plans.

POLICY IMPLEMENTATION:

1.Idaho State law should include sufficient authority for the state to undertake and implement contingency plans in the event of a petroleum shortfall in the state.

2.Expand the authority of cities in the state to consider mass transit, funded through local option taxes.

3.Encourage the use of/or conversion to heavy residual fuels in those large boiler applications where diesel fuel or electric energy might otherwise be utilized. Emphasis should be placed on heavy fuels low in sulfur.

4.Encourage the use of propane for transportation and heating.

5.Encourage and promote biological derived fuels production when such production displaces petroleum products.

6.Encourage development of the petroleum resources of the Rocky Mountain Overthrust Belt in Idaho in a manner that helps meet the state's needs, with appropriate protection of the environment.

7.The state should clearly establish the rate and minimum duration of its severence taxes applied on the extraction of petroleum resources in Idaho.

8.The Land Board should review the feasibility and potential costs and benefits of the state retaining possession of portions of the petroleum resources developed on state lands, and federal lands, if appropriate.

9.Encourage car and van pooling and the development and operation of bicycle transporation routes.

Substantiating data and additional technical information relating to this section can be found in Appendix D.

NATURAL GAS

OVERVIEW:

Idaho has no commercially developed natural gas production, although continued drilling in the Overthrust area of eastern Idaho may provide Idaho with an indigenous supply of the resource. Natural gas enters Idaho through the Northwest Pipeline Corporation transmission system and is distributed by Intermountain Gas Company and Washington Water Power to 110,000 Idaho customers. Approximately one-half of the natural gas used by Idahoans is imported from Canada, with the balance coming from resources originating in the Rocky Mountains and the Southwest.

Natural gas consumption accounts for 20 percent of Idaho's energy use. Idaho's natural gas consumption increased annually until 1973, remained stable through about 1977 and recorded its first significant decrease in 1978, resembling demand trends in other states. This decrease leveled in 1980 and 1981 to about 450 million therms per year.

CURRENT SITUATION:

Potential

Currently the natural gas companies serving the state are capable of increasing supplies to Idaho customers by 50 percent with existing delivery systems and supply contracts. Idaho's supply of natural gas is better than that of most states. At the end of 1980, Northwest Pipeline's total natural gas reserves stood at 7.5 trillion cubic feet. Total reserves are equivalent to approximatley 21.3 times the preceding 12 months' production. Idaho's supply is further enhanced by regional storage facilities for peak shaving delivery.

The existing surplus of 313 million therms of natural gas per year in Idaho could supply the needs of 391,000 additional homes, based on the average use of 800 therms per year. This 313 million therms could also displace 900 megawatts of electric heating, or the equivalent of commercial and industrial uses, or would be able to generate 460 megawatts year around.

On peak days during the coldest time of the year, 1,200,000 therms are available over and above existing demands. This would heat 120,000 more homes, or displace 550 megawatts of electricity.

Economics

All of Idaho's natural gas is imported; therefore the state has little influence on price. The state's role is confined to ratemaking, shaping consumption patterns through conservation policies, and the siting of distribution and storage facilities. The state also leases state owned land for natural gas and oil exploration. The Department of Lands has accepted bids for several oil and gas leases on state owned land in the Overthrust Belt.

To encourage exploration for new reserves, the Natural Gas Act raised the marginal price of newly discovered gas. This, coupled with a recent shift in discoveries from oil to natural gas, indicated that higher prices may promote exploration and discoveries. Deregulation of natural gas will have less effect on Idaho users than on those for most of the nation because 50 percent of our contract supply is already deregulated Canadian gas. This should have a positive impact on Idaho's industry.

With the anticipated new high efficiency gas furnaces, such as the pulse combustion furnace, seasonal efficiency could reach 94 percent, compared to 55 to 70 percent efficiencies today. Widespread use of the new furnaces will further extend available supplies. The present price differential between gas and electricity, which favored use of electricity, has already begun to shift in the opposite direction. The combination of increased electric rates and high efficiency gas furnaces should make gas more attractive to Idaho users in the future.

Environmental Concerns

Natural gas is the cleanest nonrenewable fuel to supply and use. Pollution controls for gas-using equipment will continue to be less complex and less costly than those for any major industrial fuel. Using natural gas as a combustion agent generally produces, according to EPA criteria, less pollutants than combustion from either coal or oil using the best available pollution control technology.

Social Impact

Continued or accelerated use of natural gas in Idaho will have little social impact, beyond the possible economic benefit to consumers, if the displacement of electricity by natural gas slows the increase of state electrical rates. Accelerated development in the Overthrust area could have impacts similar to those already mentioned for petroleum.

ISSUES:

- **Does the need exist for policies and programs that will encourage the use of natural gas to displace electricity as a fuel for space heating?**
- **Should further exploration of Idaho's Overthrust Belt be encouraged?**
- **Should severance taxes and/or other recompense to the state be encouraged and should these be used to mitigate the impact of communities affected by natural gas development in the state?**

POLICY STATEMENT:

It is the policy of the state of Idaho that natural gas should be considered a priority in Idaho's future energy mix.

POLICY IMPLEMENTATION:

1. The Idaho Public Utilities Commission should insure that natural gas rates in Idaho (a) encourage the increased use of natural gas for space heating and water heating and (b) encourage efficient use of natural gas by all existing customers.

(continued on next page)

POLICY IMPLEMENTATION (Continued)

2. Utilities should be encouraged to promote conversion from oil and electricity to natural gas for space and water heating, so long as existing and projected supplies are adequate to meet existing and projected demand.

3. The state should encourage development of the Rocky Mountain Overthrust Belt in Idaho in a manner that helps meet the state's needs, with appropriate protection of the environment.

4. The state should clearly establish a rate and minimum duration of its severance taxes applied on the extraction of petroleum resources in Idaho.

5. The Land Board should review the feasibility, including potential costs and benefits, of the state retaining possession of portions of the petroleum resources developed on state lands, and federal lands, if appropriate.

Substantiating data and additional technical information relating to this section can be found in Appendix E.

Renewable Energy Resources

Idaho's present and future energy resource development is related to renewable resources. Electricity generated from water is an integral part of Idaho's history. Wood and geothermal energy have also been utilized. The majority of Idaho's known indigenous energy resources can be classified as renewable: water, sunshine, wind, geothermal, wood, agricultural crops, crop wastes and municipal solid wastes.

The state's hydroelectric system is testimony to the extent that a renewable resource can be developed. While the opportunity to enlarge the system is limited, similar developments can be envisioned for geothermal or solar energy. Increased use of solid waste for the production of energy by cities and counties will add another source to our mix of energy resources. Cogeneration using a renewable fuel is already underway in the state's forest products industry.

In some cases these renewable resources are uneconomical or underutilized. In many cases their extent and potential are undetermined. Despite these uncertainties, and because in most cases the technology for their development is feasible and available, the Board acknowledges the potential of renewable energy resources to supplement or displace the use of nonrenewable energy resources and encourages their development by private enterprise and local units of governments to contribute to Idaho's energy mix of the next 20 years.

COGENERATION

OVERVIEW:

Cogeneration is the sequential production of both useful heat and electricity. Congeneration is more energy efficient than separate power and thermal heat generation. Additionally, development of non-utility owned power generation facilties may alleviate to some degree the financial demands on utilities for new generating plant construction. Utilities participate in cogeneration through the purchase of the electricity. Idaho industries are currently generating approximately 100 megawatts of electricity by cogeneration.

Recent decisions by the Idaho Public Utilities Commission, based on the federal Public Utilities Regulatory Policy Act (PURPA), encourage the generation of electricity by industry. The decisions direct that firms can sell all power generated by qualifying facilities to the utility grid at the avoided generated cost rate and the same firm can purchase needed electricity from the grid at the regulated rate.

CURRENT SITUATION:

Potential

The three key industries with potential for cogeneration in Idaho are forest products, food processing and industrial chemicals. The forest products industry represents the most promising opportunity for cogeneration. The Potlatch Corporation's Lewiston cogenerating facility, a large wood fired boiler, was financed with a $71 million revenue bond for pollution control and industrial development by Nez Perce County. This facility has a 48.8 MWe capability. Amalgamated Sugar at Nampa is considering using congeneration during the processing season. The chemical industry which consists chiefly of phosphorus production, has the potential of utilizing significant quantities of high temperature slag for electrical generation if the energy can be recovered.

Factors which influence the recoverability of waste heat include availability of waste heat, availability of uses, waste heat sources and economics. Availability and temperature ranges may be offset by the necessity of matching quantity and quality of waste heat with intended uses.

Another potential source of cogeneration is municipal solid waste which can be combusted for cogeneration purposes. The new Cassia County resource recovery facility presently produces steam from incinerated solid waste. The steam will be sold to the Simplot food processing plant in Heyburn. The plant has been constructed to allow the addition of electric generation equipment when the amount of solid waste increases to the volume that will support such a facility.

Economics

The economic advantage of selling power at the higher avoided cost rate while purchasing power at the lower regulated rate is an incentive for development.

During the past five years the Potlatch Corporation has spent $100 million dollars on cogeneration projects in Idaho.

Environmental Considerations

Because more useful energy is produced in cogenerating facilties, there are less air emissions per unit of energy provided.

ISSUES:

— **Should development of non-utility owned power generating facilities be encouraged to assist in alleviating the demand on utilities for new power plant construction?**

POLICY STATEMENT:

It is the policy of the state of Idaho to promote the construction and operation of cogeneration facilities within the state where such facilities are competitive with other supply options and are environmentally acceptable.

POLICY IMPLEMENTATION:

1. The state should enact legislation to permit revenue bonding that will include cogeneration facilities.

2. The Idaho Public Utilities Commission should periodically review its cogeneration policies to ensure that they are adequate to encourage development of industrial cogeneration.

Substantiating data and additional technical information relating to this section can be found in Appendix F.

HYDRO

OVERVIEW:

Low cost electricity generated from dams operated by the public and private utilities and the federal government has played a key role in the development of the Northwest. Hydropower plays a major role in Idaho's electricity supply. As recently as 1970, two of the state's major electric utilities generated all their power through hydroelectric resources. The hydroelectric resource in Idaho, and the region, is well developed. Even though other new generating resources will be utilized during the next two decades, hydroelectricity will remain a major contributor to Idaho's energy supply.

Although most hydroelectric sites have been developed, small sites in the state remain. In addition, many non-power dams have the capability to accept generating equipment. Existing power projects can provide increased capacity through upgrading the generating equipment.

As of 1980, Washington Water Power was generating more than 75 percent, and Idaho Power Company more than 70 percent, of their electric energy from hydro resources. A similar hydro dependence exists for the rural cooperatives and municipal companies served mainly by the Bonneville Power Administration. Utah Power and Light Company's system is predominately thermal, with approximately five percent provided by hydropower.

Idaho Power Company is currently upgrading and expanding its hydroelectric system with 529 megawatts of new capacity planned for or currently under construction. Facilities at Cascade are being upgraded, while new facilities on the North Fork of the Payette are planned. The city of Idaho Falls recently installed bulb turbines. Projects are under consideration at Lucky Peak and Palisades dams. Most of these sites represent small generating capacity potential.

At a time when Idaho's electric generating capacity is being stretched, these small scale developments can offer additional near term electricity. Much of the interest in small sites is due to the PUC's ruling pursuant to the Public Utility Regulatory Policy Act, which requires electric utilities to purchase cost-effective resources generated by others. This situation, coupled with recent investment and energy tax credits, makes the development of small hydropower systems an attractive investment.

CURRENT SITUATION:

Potential

The Energy Resource Policy Board, as shown in Appendix F on Conservation and Renewable Resources, had the benefit of a number of studies on hydro resource potential. While there was considerable variance in the study projections, the most likely and conservative undeveloped potential projects are estimated by the Idaho Department of Water Resources' to produce approximately 670 megawatts.

The Department arrived at this projection through careful screening of the National Hydropower Study of the U.S. Army Corps of Engineers and utilizing economic and environmental factors. The study contains 46 sites that are identified by cost of electricity per kilowatt hour, assuming those costs will eventually be competitive.

This study indicates that by 1985, 376 megawatts, at a cost of 50 mills, could be available. By the year 2000, an additional 294 megawatts could be added, at a cost of between 75 and 100 mills.

Economics

From the perspective of the potential private power producers, PURPA obviously offers an enormous economic incentive. To date, the potential has far exceeded actual performance, but that should change as the utilities develop their procedures.

The major barrier at this time is the lack of attractive financing available to small developers and public entities. The utilities and large private firms often have access to better financing and the private firms are able to use investment tax incentives to full advantage.

Environmental Concerns

Hydropower is generally considered to be environmentally benign, because no pollution or toxic by-products are produced, nor is water being consumed. However, environmental impacts do occur when stream flows are changed. Such items to be considered include:

- Creation of a biologically impoverished zone caused by fluctuations of reservoir's water level.
- Alterations of downstream habitats.
- Inundation of existing habitats created by impoundments of water.

Health and Safety Impacts

Concerns include dam safety and potential effects of dam failure.

Social Impact

A consideration should be given to the locations of any facilities that would affect recreational activities.

ISSUES:

- **Will hydropower continue to play an increasing role in the states energy supply?**
- **Should local government be given revenue bonding authority for energy facilities?**

POLICY STATEMENT:

It is the policy of the state of Idaho to provide a regulatory climate and incentives which will encourge development of hydropower sites that are economically feasible and environmentally acceptable.

POLICY IMPLEMENTATION:

1. Local revenue bonding authority, through a consitutional amendment, should be made available for hydropower development by local government units.

2. The Idaho Public Utilities Commission should periodically review its policies to insure they are adequate to encourage development of small privately-owned hydropower systems in the state.

Substantiating data and additional technical information relating to this section can be found in Appendix F.

GEOTHERMAL

OVERVIEW:

Geothermal energy is a resource that can make additional contributions to Idaho's energy future. Geothermal energy can be very beneficial, provided the resource is utilized in an environmentally acceptable and economical manner.

Geothermal energy has been a part of Idaho's history for many years. Early applications made use of hot springs to heat homes or feed health spas. Unlike other states, much of Idaho's population resides adjacent to the resource. Almost two-thirds of the state's population is near known geothermal resources found along the Snake River plain. These are primarily moderate temperature, hot water resources with a significant potential for space heating and agricultural product processing. Geothermal energy can be exploited with available technology and can be competitive with conventional fuels for a variety of applications.

CURRENT SITUATION:

Potential

The geothermal potential in the state can be developed in two ways: a) direct use and b) the production of electricity. Temperatures required for direct use can range from as low as 60°F for aquaculture or groundwater heat pumps, to over 270°F for some industrial processess. Temperatures around 160°F are well suited to space heating. To produce electricity, the water temperatures should be at least 270°F. In Idaho, the use of geothermal energy for the production of electricy is in the development stage. On the other hand, the technology for direct utilization of geothermal energy is readily available.

Geothermal energy has been used for space heating in Boise since 1893, and in the Hailey-Ketchum area for many years. Currently several greenhouse operations are in operation near Boise for fresh and cut flowers. Other greenhouse operations using geothermal energy are located at Weiser, Grand View, White Arrow Ranch near Bliss, the Banbury Hot Springs area in the Hagerman Valley, on the South Fork of the Payette River and near Raft River.

The area with the greatest potential for greenhouse operation is the Bruneau-Grand View area, where high yield irrigation wells tap thermal aquifers with water temperatures ranging from 68 to 183°F. The area is not ideally located near major transportation routes but could support winter crops that would replace crops currently shipped in from states with more favorable climates.

It appears that the greatest potential for rapid on-line industrial process heat is in the Boise, Nampa-Caldwell, Pocatello, and Weiser areas, where geothermal discharges from several wells are known. Existing industry in these areas could possibly be induced to retrofit to geothermal process or space heat, if sufficient temperatures and flow rates can be found.

The city of Boise is expanding the original Warm Springs geothermal system. The state of Idaho has drilled two wells adjacent to the Capitol Mall building complex. As a result of this drilling, the state is in the final stages of securing bids to construct a geothermal heating system for the complex.

Groundwater heat pumps generally provide a large energy savings over present heat sources and utilize water temperatures too low for direct space heat. As an example, there is a good possibility that the Lewiston-Orchard Irrigation District can use its 75 degree water in a ground water heat pump for heating a new school and for the District's building. Discussion has been initiated between the city of Lewiston and a local soft drink bottling company to use recently found low temperature water in a joint project and the city is also investigating the use of this geothermal resource to speed up the process at their sewage treatment plant.

Hot water with a temperature of at least 270°F can be used to effectively generate electricity. Idaho does not appear to have any high temperature resources like the 400°F dry steam sources utilized at the Geysers electrical generating plants in California. Lower temperature waters can produce electricity utilizing a binary cycle system which transfers the heat to a secondary working fluid, such as isobutane, which in turn is used to drive a turbine generator. The U.S. Department of Energy's pilot plant at Raft River utilizes such a system and has a design capacity of 5 MW. At the time of this writing, the future of the Raft River operation is uncertain, since federal funding for the project is being terminated. However, several experimental plants incorporating a hot water-binary cycle concept have been constructed and indicate promising technical feasibility.

Economics

It is difficult to generalize about the economics associated with geothermal energy use. The economics are very site dependent and, of course, vary depending on the end use. Nonetheless, specific examples can be given that demonstrate the positive financial payback of a geothermal application. Eight buildings in the state's Capitol Mall are being retrofitted for conversion to geothermal heating. A net saving of $9,066,904 in natural gas costs over a twenty year period is projected.

In support of geothermal development, the legislature passed amendments in 1979 that expanded the authority of local units of government to utilize geothermal resources. Counties now have the authority to establish and operate geothermal space heating systems, IDAHO CODE 31- 868 (31-869) (Supp. 1981). Cities are empowered to establish and operate geothermal space heating or cooling systems, Id. §50-323, (1980); moreover, cities may finance the systems either with city coupon bonds, Id. §50-1020 (1980), or revenue bonds, Id. §50-1029(b) and 50-1030(e) (1980).

Environmental Concerns

The disposition of spent geothermal water poses the potential for thermal pollution of adjacent waterways. In the case of the Capitol Mall geothermal project, this presents no problem, as the spent water will be injected into a second well to return to the aquifer. Caution should be taken as more and larger geothermal systems are developed in the state to adequately plan for disposal of waste water.

Health, Safety and Social Impacts

Present and increased use of Idaho's geothermal resources poses no health, safety or societal problems.

ISSUES:

- How should geothermal waters be incorporated into state codes regulating water use?
- What financial mechanisms can be generated to assist with geothermal development?
- How can the state assist in the development of its geothermal resources?

POLICY STATEMENT:

It is the policy of the state of Idaho to assist in the development of the state's geothermal resources. Since the great majority of Idaho's geothermal resources are in the lower temperature ranges, this development should be oriented toward such uses as space heating and agriculture processing.

POLICY IMPLEMENTATION:

1. The state of Idaho, through its agencies and universities, should provide technical assistance to determine both the economic and technical feasibility of potential geothermal resources and encourage their development.

2. The state should dedicate revenues that come to the state from federal geothermal leases to supplement the technical assistance program.

3. The state should integrate the use of geothermal resources into the Idaho State Water Plan.

4. Geothermal development should be encouraged by the state by amending the Idaho Constitution to extend authority to **all** units of local governments, including irrigation districts, for the purpose of issuing revenue bonds for such development where economically feasible.

5. The state should include the development of geothermal energy systems as an appropriate use of industrial revenue bonding.

6. When available and economically feasible geothermal space heating should be considered in the design of all the state buildings.

Substantiating data and additional technical information relating to this seciton can be found in Appendix F.

SOLAR

OVERVIEW:

During the next twenty years, solar energy offers a potential to supply a more significant portion of Idaho's future needs, as the state has the climate to utilize this form of energy. Solar can be employed for space heating, hot water and, to a lesser degree, space cooling and industrial process heat. Use of solar energy can benefit Idaho residents, because it will save nonrenewable resources and reduce environmental pollution.

Building designs are now being developed and utilized that take into account the sun's energy contributions in both active and passive forms. The primary deterrent to increased utilization of solar energy is the relatively high installation costs for active systems.

CURRENT SITUATION:

Solar energy is being utilized in Idaho. A 1979 survey done by the Energy Experiment Station at ISU identified only 96 structures using some sort of solar assistance. A second study, completed in 1981 by the state's Energy Extension Service (EES) centers describes 747 solar systems operating in Idaho. These systems range from sophisticated projects like the Amity School in Boise and the hot water heating systems for ISU's high rise dormitories to many do-it-yourself attached solar greenhouses, stock watering troughs and solar heated farrowing sheds. Many of these projects have been assisted with federal grants. The area's first major industrial solar application came on line in 1981 at Ore-Ida Foods, Ontario, Oregon plant whose solar collectors are projected to replace about 7 to 10 percent of the plant's current energy use. The city of Burley, in cooperation with the Bonneville Power Administration has begun a domestic solar hot water heating demonstration program. Most of the state's private and public utilities are undertaking similar demonstration programs in their service areas. These programs include both technical and financial assistance.

Potential

The technical potential of solar applications was examined by the Conservation and Renewable Task Force of the Idaho Energy Resource Policy Board. Its report, found in Appendix F, examines the potential for solar space heating and water heating applications by the years 1990 and 2000. Residential solar water heating could potentially displace about 130 megawatts of energy by 2000.

The state of Idaho has taken administrative actions to support the growth of solar energy. Technical assistance and educational programs are offered by the State Division of Energy and state universities. The Idaho Public Utilities Commission has ordered the state's investor owned utilities to offer financial assistance for solar water heating. Additional technical assistance is available through private equipment businesses.

Economics

As conventional energy costs continue to escalate, solar energy is expected to become more economically competitive. Solar hot water heating has become cost-effective in certain areas of the state, however the initial cost of equipment has been a deterrent to installation of solar water heating systems.

Passive solar applications when considered at the time of construction are the most economically favorable. The siting of the structure, the appropriate use of openings to benefit from the natural exposure to the sun's rays and the possibility of incorporating a storage mass such as a trombe wall into the structure's design all have a relatively small impact on the initial cost of construction and will considerably reduce the structure's use of conventional heat sources. Some passive solar retrofits to existing structures, such as an attached solar greenhouse, are also economically acceptable.

Economic barriers are being addressed through technological advancements and tax incentives. Tax incentives take the form of tax credits or deductions applied at both the federal and state levels for a portion of active solar system costs. A federal tax credit for 40 percent of the cost of a solar system was enacted in 1980. However, it does restrict the eligibility of passive systems.

Due to high installation costs, several states have taken steps to provide further incentives. In California, there is a 55 percent income tax credit, and San Diego County now requires solar heating in all new residential construction. Colorado has a 30 percent tax credit; New York has increased its tax credit to 55 percent and neighboring Oregon has a 25 percent residential tax credit which can be taken in addition to the federal credit of 40 percent.

As an incentive to business and industry Oregon has also established a tax credit of 35 percent for the installation of renewable resource systems and waste heat recovery measures. They also offer the sale of general obligation bonds and property tax exemption for renewable resource systems. It should be noted that Oregon has more than twice the number of solar systems per capita as Idaho.

In 1976, the Idaho Legislature approved a measure to provide income tax deductions for the residential installation of solar equipment. The deduction equals 40 percent of the system cost in the first year, and 20 percent each year for the next three years. The maximum deduction in any one year is $5,000. If an Idaho resident has a net income of $10,000 or more, the deduction for solar equipment costing $5,000 would be $2,150 the first year, with a remaining deduction of $225 in each of the next three years. The impact of the law has reduced the initial outlay required to install a solar heating system.

Environmental Considerations

Solar Energy applications will not adversely affect Idaho's environment.

Health, Safety and Social Impacts

Solar Energy applications will not adversely affect these areas.

ISSUES:

- **Should the state continue and even enhance tax incentives for all types of solar energy systems?**
- **How should building codes be changed to serve the needs of solar energy utilization?**
- **Should the state, through its educational system and agencies, assume the responsibility for providing this information?**

POLICY STATEMENT:

It is the policy of the state of Idaho to encourage the use of solar water and space heating where practical and economically feasible.

POLICY IMPLEMENTATION:

1. The state, through its agencies and universities, should provide technical assistance to all energy users to determine both the economic and technical feasibility of potential solar energy resources and encourage their development.

2. The state should require that all new state buildings be designed to include the use of solar energy when practical.

3. The state should continue to work with the financial community to develop confidence in solar systems and appropriate valuation procedures.

4. The state should continue its existing tax deductions for conservation and renewable energy resources.

5. Building codes should require that new construction include provisions for future installation of solar water heating devices.

6. The state, through, the Idaho Public Utilities Commission should continue to encourage electric utilities to offer financing programs for solar systems and to make the progams universally available among ratepayers, with particular attention to low income households.

7. State law should require cities and counties to guarantee solar access to the greatest extent possible in new and existing structures.

Subtantiating data and additional technical information relating to this section can be found in Appendix F.

MUNICIPAL SOLID WASTE/RESOURCE RECOVERY

OVERVIEW:

One form of resource recovery is the generation of energy from municipal solid waste. It provides an opportunity to combine two pressing needs in Idaho: waste disposal and new energy production. The state's landfill areas are rapidly diminishing and disposal costs are high and rising. It is the value of the disposal service, in conjunction with the income from recovered energy, that makes resource recovery systems economically attractive.

The technology involved in municipal solid waste (MSW) steam generation dictates that the use of MSW generation is not practical in cities of less than 10,000 population. Considering this, the calculated potential displacement, assuming that the major population centers utilized MSW resource recovery systems, would be 37,000,000 Kw hrs/yr or 1.28×10^{11} btu/yr.

Unlike other energy resources, the supply of solid waste cannot be turned off or stored for any length of time. Energy recovery systems offer one way of reducing the quantity of waste disposed of in landfills; typically the quantity of material will be reduced by 75 percent, increasing the life of present landfills.

Two of the most important prerequisites for energy production from municipal solid waste are a guaranteed, or at least a reliable, source of solid waste over the projected life of a facility, and the long term commitment from a dependable customer for the purchase of steam or energy.

CURRENT SITUATION:

Potential

A number of recovery techniques are available, including mass burning and processing the MSW to produce refuse derived fuel (RDF).

Not all municipal waste is combustible material and some facilities do not first separate those non-combustibles. In this case, the mass burning method, all material is fed into the burner and any material not burned is then separated from the residue and disposed of through landfill or sold. In the Resource Derived Fuel method all of the solid waste collected is sorted prior to burning. The non-combustibles are processed for sale or disposal and all of the combustible material is shredded or otherwise processed into pellets or another solid form and used as fuel for a burner.

Mass burning of unprocessed waste can be accomplished in large-scale waterwall boilers, or in smaller 25 to 50 ton per day modular incinerator units. Energy recovery facilities using large-scale mass burning have been operating in Europe for decades. A few modular incinerators and large-scale waterwall incinerator facilities in the United States are currently recovering steam from municipal solid waste.

Cassia County began a solid waste recovery program this year and will be marketing the steam to the nearby Simplot food processing plant in Heyburn. The plant has been constructed to allow the addition of electric generation equipment when the amount of solid waste increases to the size that will support such a facility. Similar resource recovery facilities are being planned by the University of Idaho and in Pocatello.

Economics

At the present time cost for MSW mass burning facilities are estimated to run between $1800 and $2500/Kw. A 1000 tons per day (TPD) plant would run as low as $1800/Kw equivalent while a 200 TPD plant would cost in the range of $2500/Kw equivalent.

Energy recovery will become more financially attractive to municipalities in the future, as the costs for motor vehicles, fuel, wages and landfill continue to rise.

Environmental and Social Impacts

The ash produced by the combustion of solid waste is a sterile material which can potentially reduce environmental problems. Municipal solid waste facilities offer communities a method for ready disposal of garbage as well as a source of additional energy. The dollar costs to a community for purchasing land and operating landfills as well as the odors and unattractive visual sights that may accompany land disposal of garbage can be avoided

ISSUES:

- **Is municipal solid waste a viable source of energy for Idaho?**
- **Will it be necessary for the state to provide incentives to municipalities in order for MSW to be utilized?**
- **Should these incentives be in the form of direct aid or legislation governing revenue bonding?**

POLICY STATEMENT:

It is the policy of the state of Idaho to encourage the development of municipal solid waste power generating facilities in those areas where economically feasible.

POLICY IMPLEMENTATION:

1. Local revenue bonding authority should be made available for the installation of MSW power generating facilities.

2. The state of Idaho should make information available to local governments regarding MSW feasibility.

Substantiating data and additional technical information relating to this section can be found in Appendix F.

WOOD

OVERVIEW:

Wood can provide a portion of Idaho's future energy needs. Although wood as a fuel has primarily been used for home heating, it is also being used by industry in the state for the generation of steam and electric power.

CURRENT SITUATION:

Potential

It is estimated that wood is currently being utilized for space heating by over 10 percent of Idaho's single family residences, and could rise to 20 percent by 1990.

Wood waste (mill residues, etc.) is currently being used as a fuel in many of Idaho's lumber facilities providing a significant portion of their energy needs.

Two such examples are the fluidized bed boiler utilizing wood wastes at the Boise Cascade Emmett facility, and the high pressure steam boiler of the Potlatch Corporation at its Lewiston facility. Both are recent additions to the plants and both use wood wastes generated at the facilities. Our electric utilities are also considering wood resources for future electric supply. The Washington Water Power Company is currently constructing a 42.5 megawatt wood waste plant for use in its system and a consortium in Northern Idaho is constructing a 28 megawatt wood fired facility and negotiating a power sales contract with the Bonneville Power Administration.

Economics

The capital costs for a wood-fired power plant of a size in the range of 20-50 MW is between $1000 and $2000 per Kw (1981 $). Average costs are somewhat more than a coal fired plant which costs approximately $900 to $1200/Kw for a 400 MW facility which has the economy of scale. It is unlikely that wood-fired plants will be built that exceed 50 MW, due to the problem of supplying fuel.

Environmental Concerns

There are some environmental implications attached to the use of wood. The majority of domestic wood heating systems are not equipped with any type of pollution control devices, resulting in the release of smoke, particulates and contaminants into the atmosphere.

The control of pollution on larger industrial size facilities is now regulated. The technology exists and devices are in place with the result that industrial wood burning facilities are operated in an environmentally acceptable manner.

Health, Safety and Social Impacts

In addition to the increased risk of residential fires from the improper installation and maintenance of wood stoves, the growth and harvesting of timber may raise problems of zoning and land use planning, aesthetics and conflicts with recreational land use.

ISSUES:

- Should the state encourage the use of wood as a fuel for residential space heating systems?
- Should the state continue the current income tax deduction for wood stoves?
- Should the state institute laws requiring pollution devices on residential wood heating systems in high population density areas?
- Should the state encourage its utilities, municipalities and private industry to consider the use of wood as a fuel for power generation?

POLICY STATEMENT:

It is the policy of the state of Idaho to encourage the development and use of more efficient and environmentally acceptable wood burning apparatuses.

It is the policy of the state of Idaho to encourage the use of wood as a fuel for power generation by utilities, private industry and others when such use is environmentally and economically competitive with other forms of fuel.

POLICY IMPLEMENTATION:

1. Amendment to Idaho law should be made to discontinue the current income tax deduction for wood stoves.

2. Industrial or municipal revenue bonding should include a priority consideration for cogeneration facilities utilizing the wood wastes of the Idaho forest products industries.

Substantiating data and additional technical information relating to this section can be found in Appendix F.

WIND

OVERVIEW:

Idaho's wind energy resource may have the potential to provide electric generating capacity. At present, the lack of data on the nature and extent of the resource makes it difficult for complete analysis on the potential of wind for electrical generation.

In the past, Idaho has utilized its wind resource for water pumping and remote site electric generation. The Rural Electrification Act, in conjunction with the Bonneville Power Administration, brought utility electric energy to the state's rural areas beginning in the 1930s. Wind energy plants could not compete with this reliable system and most units were a abandoned.

Wind systems have several distinct advantages and disadvantages. Wind plants can be constructed in standard sizes and are not as limited as hydroelectric facilities in location. At the present time, regulatory requirements for wind energy systems are far simpler than those for other electrical generating facilities

Electrical wind generation requires a great deal of knowledge of the resource, and the ability to store excess energy when the wind blows. In the Northwest, the systems can be run in conjunction with existing hydro systems. The hydro systems would provide storage capacity. This capacity, however, has limitations

CURRENT SITUATION:

Potential

The wind resource potential for Idaho is unknown. Current programs to measure this potential are being conducted by the University of Idaho, under contract with Idaho Power Company. Additional data is being gathered through wind testing programs by the Bonneville Power Administration and the Idaho Division of Energy Resources.

Economics

Economic analysis of private projects depend on many factors, including the revenue per kilowatt hour offered by the utility, actual wind speeds and the effects of tax credits for project investors.

Wind electric systems have historically been expensive and have been used primarily where conventional sources were unavailable. Newer technology wind electric systems yield electricity priced significantly higher per kilowatt hour than electricity from conventional systems.

Environmental Concerns

Wind systems produce only noise pollution with little other negative effect.

The possibility of broadcast interference from rotors with metal blades has been identified as a potential problem with wind generation. This phenomenon occurs when the transmitter, rotor blades and antenna are oriented in the same direction.

Social Impact

Development of wind as a resource will depend on the public's willingness to accept the noise and appearance of wind systems. Turbines have been installed in some urban areas (more than 50 are now being constructed in the Denver area) with very high acceptance.

ISSUES:

— **Does Idaho have siting locations where wind speeds develop adequate and consistent velocities for electrical generation?**

POLICY STATEMENT:

It is the policy of the state of Idaho that the potential for wind produced energy be determined and that possible sites for installation of wind generation systems be identified.

POLICY IMPLEMENTATION:

1. The state of Idaho should continue and expand its wind anemometer loan program to aid individuals and businesses to determine site specific wind resource information.

2. The state of Idaho should expand this program to a statewide resource assessment to determine the exact nature and duration of its wind resources.

3. The Idaho Public Utilities Commission should determine the value of a wind resource program for its electric utilities and recommend that they participate in any statewide effort.

Substantiating data and additional technical information relating to this section can be found in Appendix F.

ETHANOL

OVERVIEW:

Ethanol production for fuel use has been encouraged at the national level and in Idaho. Fuel produced from crops or excess crops can potentially provide a valuable contribution by reducing the requirements on nonrenewable fossil fuels.

Ethyl alcohol is produced by the fermentation of crops or other biological material and, at 190 proof, can be used straight in gasoline engines with minor modifications. Ethyl alcohol, purified by removal of all water, can be added up to 10 percent to gasoline mixtures and used in unmodified engines.

The production scale is flexible and varies from a small farm-size unit which can produce tens to hundreds of gallons per day to large-scale operations which produce thousands of gallons per day. A by-product of ethanol production is a protein rich substance which can be used as an animal feed supplement. Since this production can come from crops grown on Idaho farms, the state has enacted incentives to stimulate alcohol production.

CURRENT SITUATION:

Potential

Gasohol, the mixture of 90 percent gasoline (usually unleaded) and 10 percent 200 proof ethanol, has been selling in Idaho since August, 1979, with 500,000 gallons consumed that year. Approximately one million gallons were consumed in 1980. Idaho ethanol plants have the capacity to produce between 2.5 and 2.8 million gallons per year. However, the unstable attitude of both the state and federal governments regarding continued incentives have brought many plants to below capacity production in 1982.

A potential market is opening up to sell these indigenous fuels to out-of-state major petroleum suppliers who use ethanol for octane enrichment of their unleaded premium. These suppliers then sell the unleaded fuel in Idaho's retail market.

Through 1985, the contribution of ethanol used as a gasoline additive is expected to be modest, perhaps displacing about 747,000 gallons of gasoline. Production will be limited by the capacity to convert agricultural and waste material into ethanol. In Idaho, alcohol fuels may become significant sources of local supply. The potential beyond 1985 may be significant, especially if major new ethanol facilities are developed during the 1980s and if fuel users adjust to take advantage of alcohol fuels.

Economics

As crude oil and gasoline prices continue to climb, the cost of alcohol fuels will become more competitive with petroleum. Costs for ethanol fuels should be reduced through new technologies, especially those that reduce the capital and energy needed for conversion and those that improve the value of the co-products produced with the alcohol.

The federal programs to encourage alcohol production are:

1. Twenty percent federal investment credit on alcohol facilities.

2. A 40¢-per-gallon federal income tax credit on alcohol produced at 190 to 200 proof. A 30¢-per-gallon income tax credit on alcohol produced at 150 to 190 proof, and a 4¢ federal highway excise tax exemption on alcohol/gasoline blends; all of these credits and exemptions are effective through 1992.

3. Waiver of federal bonding requirements for small-scale alcohol production.

Idaho alcohol fuels legislation provides the following incentives:

1. Properly licensed producers of alcohol for motor fuel are deemed not to be making alcoholic liquor.

2. Excise tax imposed on gasohol is 4¢ per gallon less than the amount imposed on motor fuels (until May 1, 1986).

3. A state income tax deduction on the federal income tax credits.

Environmental Concerns

The major environmental concern associated with ethanol production is stillage. This stillage is biologically active and constitutes a liquid waste problem. Occupational exposure to chemicals used in a typical alcohol plant can also constitute a local exposure problem.

Consideration should be given to the air emissions and solid waste generated during the combustion of fossil fuels, especially coal, to meet process heat requirements.

This should pose minimal problems since environmental problems and control measures are well understood and represent no new problems peculiar to the alcohol fuel industry.

ISSUES:

- **Can ethanol production for fuel purposes be competitive without government incentives?**
- **Should incentives be enlarged?**
- **Does ethanol production yield a net energy benefit?**

POLICY STATEMENT:

It is the policy of the state of Idaho to support and encourage the development and use of ethanol to the extent that it provides a net energy savings in the displacement of nonrenewable fuels.

POLICY IMPLEMENTATION:

1. The current policy of the state of Idaho providing incentives for ethanol fuel production should be maintained.

2. Before approving any action to extend or modify incentives, an assessment should be made of the effectiveness of present law.

Substantiating data and additional technical information relating to this section can be found in Appendix F.

Conservation

Energy conservation, or the more efficient use of energy, has been demonstrated to be a real and cost-effective opportunity in Idaho. Unlike conventional sources of energy generation - oil, gas, coal, nuclear and hydropower, conservation potential represents a highly fragmented market which depends on the cooperation of many individual decision makers. The Board views public and private actions needed to encourage conservation as efforts in resource acquisition rather than a "social program" likely to favor one sector of society over another.

The greatest potential for conservation in the short term lies in the application of residential conservation programs. The potential for increasing energy efficiencies has been recognized by the Idaho Public Utilities Commission and by the utilities of the state in recent conservation efforts. The utilities servicing Idaho are sponsoring or are studying various measures which will greatly impact the end use consumption of energy.

A further potential for conserving energy exists in all consuming sectors of the state: residential, commercial, industrial and agricultural. Higher energy prices, improved housekeeping, recovery of waste and technological innovations will lead the natural progression toward greater energy efficiencies in these areas of consumption. Issues and policies related to conservation in the transportation sector are addressed in the petroleum section.

RESIDENTIAL CONSERVATION

OVERVIEW:

Electric rates in Idaho are among the lowest in the nation. As Idaho's electrical generation base switches from a traditionally lower cost hydro system to more costly thermal generation, the monetary incentive for conservation becomes more favorable. Based on fuel prices, consumers of oil and natural gas may presently have greater incentives to conserve energy.

Electrical consumption in the residential sector has witnessed an annual growth of 6 percent for the last decade. Comparatively low electric rates continue to attract new hookups and conversions from other fuel types. The resulting strain on existing capacity, in light of this growing demand, leads energy suppliers to search for new sources of generation.

Decisions on future energy production will be based largely on historical information and forecast and demand functions. Residential conservation could effectively shift the demand curve down, resulting in reducing the amount of new energy which current projections indicate will be needed. If conservation can indeed offset some of the new electrical demands, Idaho could experience a slower growth in utility rates without retarding the economic growth of the state.

With a recognition of the contribution energy efficient space and water heating can make to Idaho's energy supply, several programs have been developed to promote conservation. These programs are aimed at assisting the consumer either through removal of barriers to installation or in the reduction of market price. Several federal and state mandates require the regulated utilities to offer comprehensive energy audits and low interest financing for cost-effective conservation investments. The Federal Residential Conservation Service (RCS) Program was created by the National Energy Conservation Policy Act of 1978 to oversee utility performance of residential audits. Bonneville Power Administration is currently undertaking pilot conservation programs in conjunction with the state's public utilities.

At the state level, conservation has been actively promoted by the Idaho Public Utilities Commission and the Division of Energy. In addition to utility audit and financing programs, the Commission has considered rate structures to discourage new electric space heating hookups.

Similar to deductions available for solar installations, Idaho Code 63-3022B (Supp. 1981) of the State Tax Code allows a 100 percent tax deduction of allowable insulation and weatherization expenses. These tax incentives are applicable only to residences in existence, under construction or subject to an outstanding building permit on January 1, 1976.

CURRENT SITUATION:

The residential sector accounts for 18 percent of Idaho's total energy demand and 35 percent of the electricity demand. The potential of reducing energy waste is significant and can be secured quickly, simply, and cost-effectively. The challenge is to motivate consumer action to achieve a balanced energy mix at the least cost.

Potential

Conservation at the space and water heating end use levels should be emphasized as these measures are among the easiest and most cost effective mechanisms we can employ. Because 64 percent of all residences that will be occupied in the year 2000 are already built, retrofitting will be required to effect a significant energy savings. In 1980, consumption in Idaho residences required over 230 average megawatts of electric generating capacity. Without a concerted conservation effort, over 350 average megawatts of generating capacity will be required by the year 2000.

A 1981 report, Lewiston Community Energy Project, showed the potential for improving energy efficiencies through the application of building standards set forth in Chapter 53 of Idaho's Uniform Building Code. The Idaho Energy Code is subject to local adoption and enforcement with resulting sporadic acceptance. Using the Code's standards, a new home constructed in Lewiston could save over 30 percent of the base year's consumption. A home built to local utility specifications could potentially save 50 percent of the energy consumed by the average residence. If we take these results a step further and assume that all future structures built will comply with energy code standards, about 140 megawatts could be saved annually by the year 2000. Further savings can be achieved through increases in efficiency of water heating and other household appliances.

Economics

The cost benefit to the consumer conserving energy will vary according to the particular structure, prevailing fuel prices, occupant's behavior and the conservation measures taken. Residential energy audits assist consumers in identifying measures which will return the greatest economic benefit. Individual rate payers should enjoy a lower rate of increase in energy costs as a result of their conservation efforts.

On a wider scale, the state, region, and nation will benefit from decreasing reliance on foreign oil and the uncertain productive capacity of domestic sources of energy. Conservation can stimulate innovation, employment and economic growth. Studies conducted in the northwest conclude that conservation, along with other renewable energy resources can contribute more to local economic activity per unit of energy produced than conventional sources of fuel. Because energy can be conserved in small increments at dispersed locations and in shorter lead times, conservation can have a more stabilizing effect on local economies by avoiding the "boom-bust" effects which often attend development of non-renewable resources. Direct and indirect employment and induced spending effects should be recognized as positive economic benefits.

Environmental Concerns

Residential conservation and all of its facets will not adversely impact the environmental quality of this state. Being one of the most environmentally benign sources of energy is perhaps its greatest attraction to the consumer.

Health, Safety and Social Impacts

Concerns have surfaced over the noxious air quality found in tightly sealed structures as well as undesirable features of certain insulating materials. With good building designs which permit a safe number of air exchanges and proper handling of materials, these concerns can be minimized.

Conservation program managers and building maintenance personnel need to be aware of potential problems of reduced air infiltration and air exchanges in buildings due to intensive weatherization efforts. Proper design of new buildings and retrofit of existing structures can mitigate these hazards. Declining aesthetic values resulting from certain conservation measues should also be recognized as a potential social impact.

ISSUES:

- **Can residential energy conservation make a significant contribution to Idaho's future energy mix?**
- **Are additional programs and incentives such as mandatory building codes and zoning ordinances necessary to stimulate more efficient use of energy in the residential sector?**

POLICY STATEMENT:

It is the policy of the state to give high priority to the more efficient use of energy in residential structures through cost-effective retrofits and new building design.

POLICY IMPLEMENTATION:

1. Home energy audits conducted by the private and public utilities of the state should be extended to as many classes of customers as can be cost justified.

2. The Idaho State Legislature, the Idaho Public Utilities Commission and nonregulated heating fuel distributors should cooperate in designing programs which will make audits and other conservation measures accessible to customers of nonregulated fuels.

3. Idaho Code 63-2022B (Supp. 1981), providing tax deductions for conservation measures, should be amended to include post-1976 residences and multi-unit dwellings as well as allowances for owners of rental property.

4. The state of Idaho should adopt mandatory building codes that will make residential dwelling energy use more efficient.

Substantiating data and additional technical information relating to this section can be found in Appendix F.

COMMERCIAL CONSERVATION

OVERVIEW:

Inadequate insulation, oversized heating and cooling equipment, overuse of lighting and equipment, improper maintenance and inefficient switching contribute to significant amounts of energy waste in the commercial sector. Because energy is not a major cost, conservation has had a low priority in the commercial decision making process. However, rapidly rising energy prices are now inducing commercial energy users to conserve.

CURRENT SITUATION:

Potential

The commercial sector consumes 12 percent of the total energy used in the state. A pilot audit program undertaken by the Idaho Retailers Association, and the Division of Energy on 15 Idaho retail establishments demonstrates that considerable savings can be achieved by their employing low cost-no cost conservation measures. The audits indicate that lighting and ventilating requirements can be reduced over 30 percent without impacting lighting and comfort levels. Cost-effective measures range from relatively low cost reductions in lighting, hot water temperatures and thermostat settings, to the more costly modifications of heating, ventilating, and air conditioning equipment.

Economics

As real energy prices increase and energy expenditures become a major cost, commercial consumers will adjust by using energy more efficiently. Several retailers who participated in the state sponsored retail audit program have demonstrated the cost benefits of conservation. Block's Department Store in Pocatello has achieved a 38-percent decrease in natural gas use and a 13-percent decline in electricity demand, representing a savings of more than $8600. Hudson's Shoe Store in Idaho Falls employed low-cost, no-cost efforts to realize a 25-percent decline in electricity costs.

ISSUES:

- **Should the state apply mandatory lighting and thermal standards to commercial construction?**
- **Should the Idaho Public Utilities Commission implement commercial conservation programs?**

POLICY STATEMENT:

It is the policy of the state of Idaho to encourage efficient use of energy within the commercial sector of Idaho. These uses can occur through cost-effective retrofits in current buildings and energy conscious design in new construction.

POLICY IMPLEMENTATION:

1. The state should institute mandatory lighting and thermal standards that apply to all new and remodeled buildings.

2. The Idaho Public Utilities Commission should direct the state's regulated utilities to offer commercial conservation programs.

Substantiating data and additional technical information relating to this section can be found in Appendix F.

INDUSTRIAL CONSERVATION

OVERVIEW:

Industry in Idaho is dominated by food products, chemical products, lumber and wood products. Since the 1973 oil embargo and ensuing price increases, many Idaho industries have sought to improve the energy efficiency of plant and process operations. The extent of these improvements are unknown, due to the secrecy and competitive nature of industries operating in the same market. The Board, in its review of the industry of the state, felt that it was difficult to know or recommend all of the conservation opportunities for Idaho's industry. Industry will have sufficient incentive as prices rise to review and change their plant operations to be more efficient.

CURRENT SITUATION:

Potential

Idaho industries are highly energy intensive, accounting for 24 percent of all energy consumed in the state and over 40 percent of all electrical consumption. Potential energy users can practice conservation through changes in operation procedures and the use of more efficient equipment. While Idaho industry has made great strides in increasing energy efficiency, the potential exists to further reduce consumption through improved maintenance, recovery of waste and technological innovations.

Economics

Industry allocates substantial resources to optimize economic return. In terms of payback, investments in conservation, particularly waste heat recovery, can result in dramatic energy and dollar savings. Over the longer term, improved efficiencies will require large capital investments in new equipment and plants and changes in product mix and production levels. Some industries, through the installation of boiler economizers have realized paybacks from the decreased fuel costs in less than nine months.

ISSUES:

— **Should the state have a role in industrial energy conservation?**

POLICY STATEMENT:

The state recognizes that industry has inherent incentives for conservation. The state should encourage industry to implement practical and economic conservation measures.

POLICY IMPLEMENTATION:

1. The state should continue to provide boiler maintenance training to small Idaho industrial users.

2. Idaho should encourage the use of waste heat sources where economically feasible in all Idaho industry.

Substantiating data and additional technical information relating to this section can be found in Appendix F.

AGRICULTURAL CONSERVATION

OVERVIEW:

The agriculture sector is important to Idaho's economic and social stability. While the economic indicators reflect growth in other industries, agriculture remains the backbone of our state. Unlike other economic sectors of the state, agriculture has become more energy intensive in its petroleum and electric end uses. As a result, agriculture has become more vulnerable to changes in energy prices. In recent years fuel price increases have outpaced increases in farm commodity prices, thus contributing to the economic losses by many farm operations. In response to the increased demand of agriculture, some utilities have instituted pump efficiency testing programs to assist Idaho farmers in making more efficient use of their pumping systems.

CURRENT SITUATION:

Potential

Electricity and petroleum are agriculture's major energy sources. The ability of the state to deal with the availability and cost of petroleum products is limited. To a greater degree, the state can address the cost of electricity for agricultural applications. The primary uses of electricity are for water pumping from rivers, reservoirs and wells, and water delivery systems.

Energy conservation efforts currently being applied in this sector indicate opportunities for more efficient use of energy. Tests on pump systems indicate that, while vast improvements can be made in pump efficiencies, energy savings may not be achieved if more efficient pumps actually pump more water.

While the cost of electricity may dominate the energy debate in this sector, the cost and availability of petroleum resources cannot be ignored. The state, through its Division of Energy, the University of Idaho and the Cooperative Extension Service, has developed a number of programs which identify for Idaho farmers certain cost-effective conservation measures. One example of the potential savings from such programs is the effectiveness of the tractor testing workshops. Average savings for each tractor tested, after adjustments were made, was 222 gallons of diesel fuel per year. There are approximately 50,000 tractors on Idaho farms. If all were brought to full efficiency, the state could potentially save 11 million gallons of diesel fuel per year. Similar savings are potentially available through widespread dissemination of the results of other conservation programs such as minimum tillage, irrigation pumping efficiency, milk-to-water heat exchangers in dairy farming and fuel storage.

The success of programs undertaken by the state would depend upon the level of commitment made by Idaho farmers in pursuing innovative production practices.

Economics

The cost effectiveness of investing in conservation will depend upon the particular situation and should be subject to rigorous cost-benefit analyses. Over the longer term, capital expenditures for improving energy efficiencies may be more affordable than future energy price increases. Economic viability for Idaho farms will be affected by these energy choices.

ISSUES:

- What incentives can be offered to encourage energy conservation in the agricultural sector?
- How should the state reconcile conflicting goals of energy conservation and increased development of new land requiring electrically driven high lift irrigation?
- Should the state authorize funds for technical assistance to farmers for water and energy management planning?

POLICY STATEMENT:

It is the policy of the state to assist in providing the continued viability of its farm industry in the face of rising energy prices.

POLICY IMPLEMENTATION:

1. Because of the importance of agriculture in Idaho, the Public Utilities Commission should carefully consider all electrical generating capacity additions and their impacts on agriculture.

2. In order to assist Idaho agriculture with the impact of increased energy costs, the legislature should, the next fiscal year, appropriate a minimum of $250,000 for a compilation of current, effective energy-efficient farm practices and the wide dissemination of the methodologies and economic benefits of these measures to Idaho farmers.

3. The Idaho State Legislature should carefully review all state water and energy policies to reconcile conflicting goals of water and energy resource development in the state.

Substantiating and additional technical information relating to this section can be found in Appendix F.

LOCAL GOVERNMENT'S ROLE IN ENERGY CONSERVATION AND RESOURCE DEVELOPMENT

OVERVIEW:

The Board recognizes the vital role local governments will play in the state's energy future. There are a vast number of fiscal incentives and regulatory actions which local governments can take to influence the development of energy resources. While many barriers to energy development originate locally, the means to redress them often exist within the jurisdiction of local governments. State and local governments are in the unique position of adapting energy programs to local needs and making optimum use of institutional, financial and human resources. In particular, land use policies, building codes, and community service delivery systems will determine energy requirements at the local level.

CURRENT SITUATION:

Potential

Several initiatives indicate the potential range of activities that Idaho communities can pursue to determine their own energy futures. A community wide audit program sponsored by a local utility and the city of Ammon exemplifies the resourcefulness of small communities. In December of 1980, with the help of over 150 citizen volunteers, 600 dwellings were audited and hot water insulation jackets installed.

At the other end of the state, the city of Coeur d'Alene is investigating the feasibility of recovering methane gas emitted from an abandoned city landfill for use as a fuel source. Aided by financial and technical assistance from the Division of Energy and the Clearwater Economic Development Association, the city of Lewiston has studied community energy consumption patterns and recommends actions that will reduce municipal and residential energy loads. Foremost are recommendations for the enforcement of building codes and zoning ordinances that encourage efficient use of energy.

A notable example of local ingenuity is the effort undertaken by the city of Boise and the Warm Springs Water District to develop a geothermal district heating sytem for space heating of residences and downtown retail office and government buildings. It is anticipated that this system could displace the equivalence of one million barrels of oil over a five-year period.

The cities of Lewiston and Boise have both made statutory commitments to energy conservation. Boise has amended its Metropolitan Plan to encourage improved bicycle/pedestrian facilities and to promote conservation by means of land use planning and design techniques. Nez Perce County also incorporated into its comprehensive plan similar elements. Many other cities and counties are in the process of taking like actions. A recent state survey of city and county officials indicated a large majority consider rising energy costs of major concern.

Economics

For the past three years, the Division of Energy has coordinated an institutional building grants program to reduce energy consumption in schools, hospitals, public care facilities and municipal

buildings. Through a combined technical audit and retrofit program, significant energy savings can be realized. As examples of potential savings, St. Anthony's Fremont School District 215 has saved local taxpayers over $57,000 annually in energy costs as a result of 48 conservation efforts initiated in ten school buildings. With $170,000 grant assistance, Nampa's Mercy Medical Center is able to save over $73,000 annually in energy costs.

This program has provided approximately $3 million worth of technical audits and energy conservation measures. Economic returns to these institutions equals 8.0×10^{11} Btus in energy savings and over $1.1 million in dollar savings. The average payback for these measures is projected to be under four years.

Overall economic benefits to local governments from energy conservation include the stimulation to local energy businesses and the tax dollars saved due to the decreased energy use in public buildings.

Environmental Concerns

Energy conservation and production at the local level is particularly attuned to environmental needs and constraints.

ISSUES:

- **Should local governments adopt mandatory building codes and zoning ordinances to stimulate energy conservation?**
- **Should the state continue to provide and expand technical assistance to local governments?**
- **Should the state authorize revenue bonding and local option taxes to finance local government energy conservation and production activities?**

POLICY STATEMENT:

It is the policy of the state of Idaho to encourage and support local governments in their efforts to assume a greater role in promoting energy awareness, efficiency and resource development.

POLICY IMPLEMENTATION:

1. Local governments should adopt mandatory building codes and zoning ordinances that will make all new buildings energy efficient.

2. The state of Idaho should continue to provide technical assistance to local governments.

3. The state of Idaho should authorize financial tools such as revenue bonding to assist in the development of local energy facilities.

Substantiating data and additional technical information relating to this section can be found in Appendix F.